Does Alternative Transposition, a potential genome-restructuring activity, occur in Petunia?

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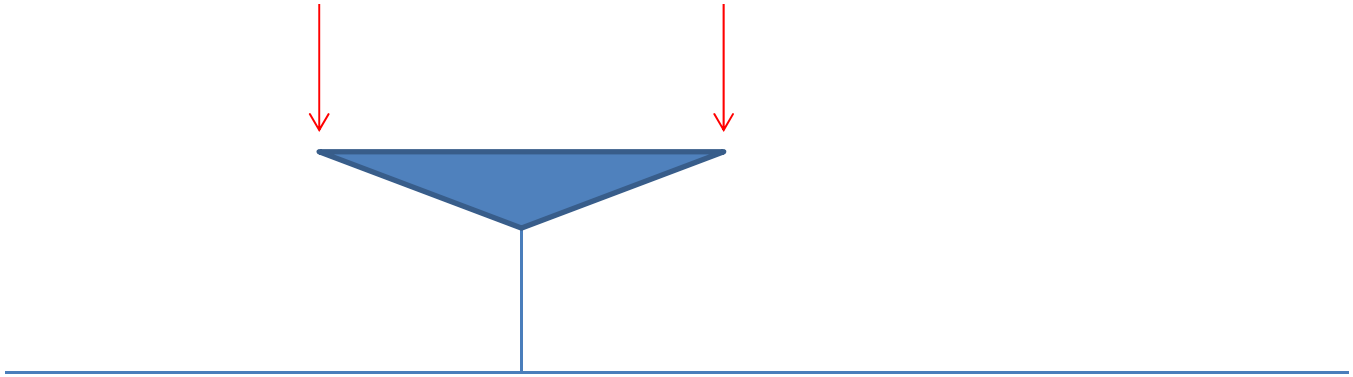
What are Transposons?

- Transposable elements (TEs) are genetic material that can move throughout the genome
- Transposase is the enzyme responsible for excising and reinserting the transposons

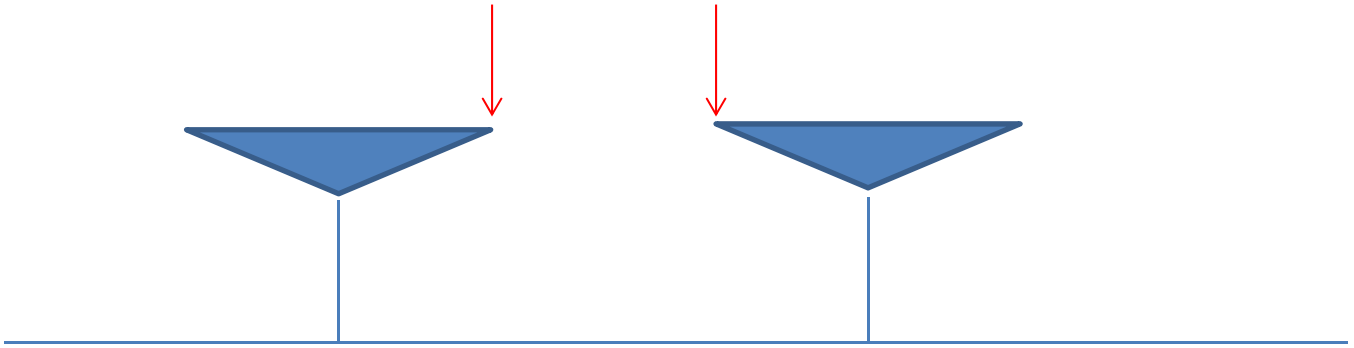
Standard Transposition

- Standard Transposition occurs when the transposase enzyme acts on the termini of the same transposable element



Alternative Transposition

- Alternative Transposition occurs when the transposase enzyme acts on the termini of two different transposable elements
- Can result in chromosomal rearrangements

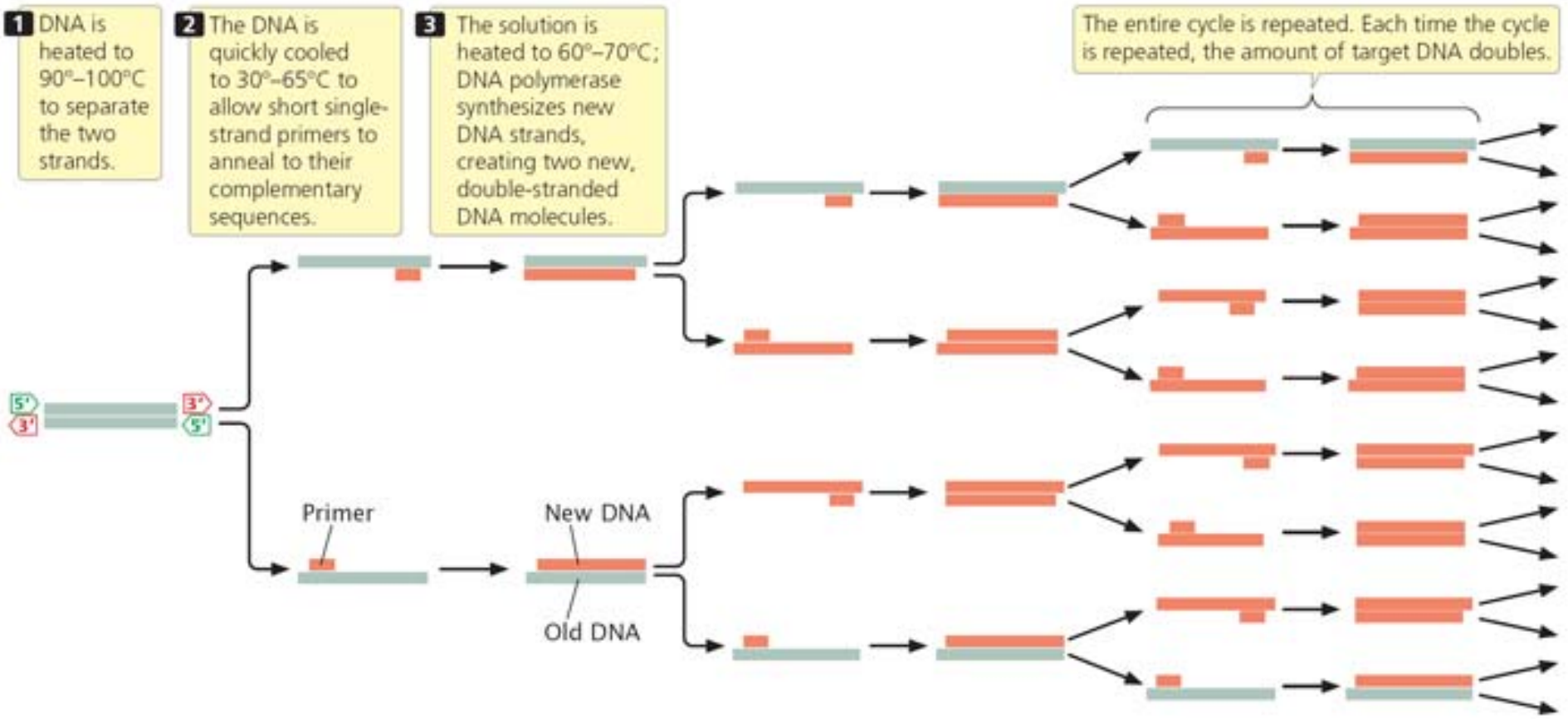


Why use Petunias as a model?

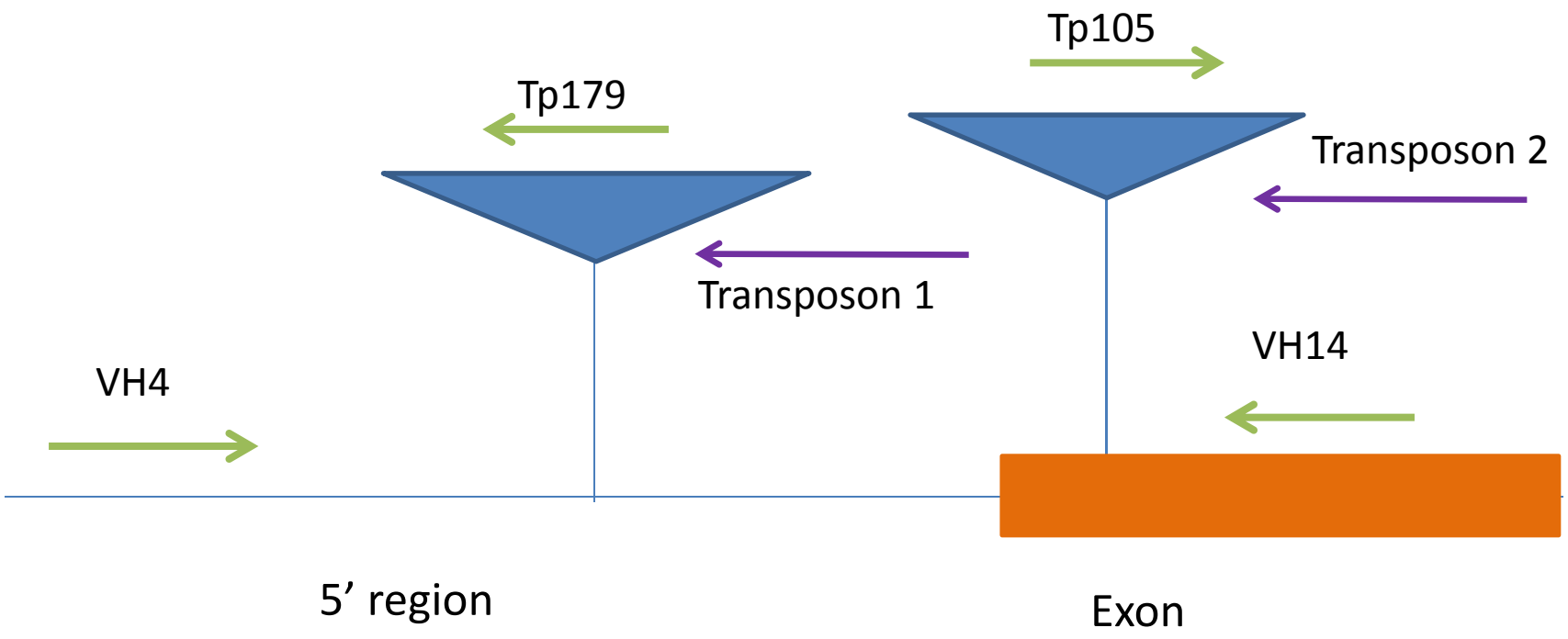
- Petunias have small, non-autonomous and highly active transposons called *dTph1* elements
- Part of the hAT transposon superfamily
- S857 allele has two *dTph1* elements located approximately 30 bp apart and facing in opposite orientations

Methods

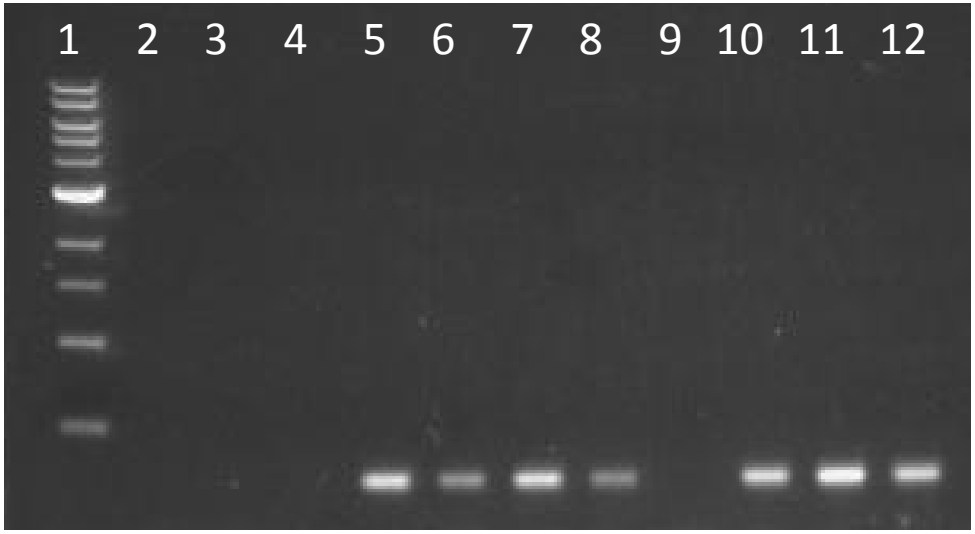
- Polymerase Chain Reaction (PCR)
- Amplifies a specific region of DNA using primers
- Amplified DNA will be run on an agarose gel
- Significant bands can be excised from gel and sequenced


1 DNA is heated to 90°–100°C to separate the two strands.
2 The DNA is quickly cooled to 30°–65°C to allow short single-strand primers to anneal to their complementary sequences.
3 The solution is heated to 60°–70°C; DNA polymerase synthesizes new DNA strands, creating two new, double-stranded DNA molecules.
The entire cycle is repeated. Each time the cycle is repeated, the amount of target DNA doubles.
5'
3'
3'
5'
Primer
New DNA
Old DNA

S857 Allele in Petunias

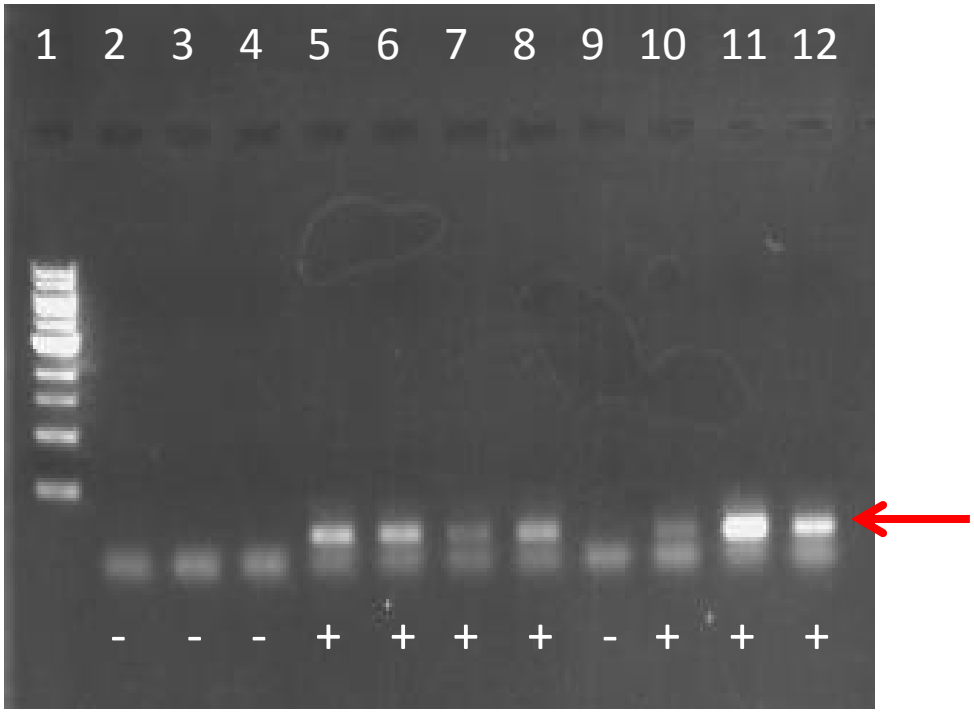


Testing for Transposon 1



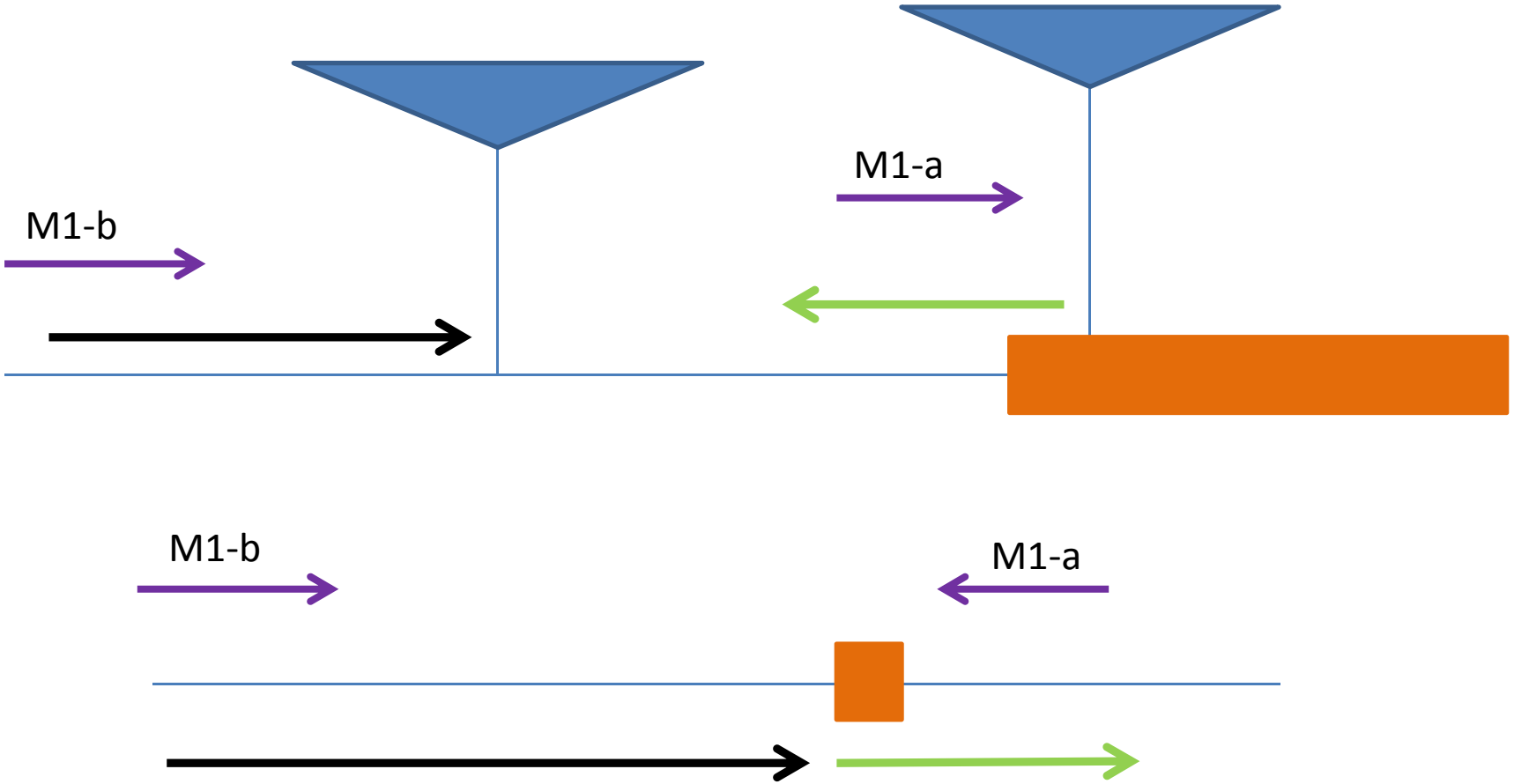
Lane	Sample
1	DNA Ladder
2	H20
3	2:12-7
4	2:12-8
5	2:12-9
6	2:12-10
7	2:12-11
8	2:12-12
9	2:12-13
10	2:12-15
11	2:18-1
12	2:13-4

Testing for Transposon 2

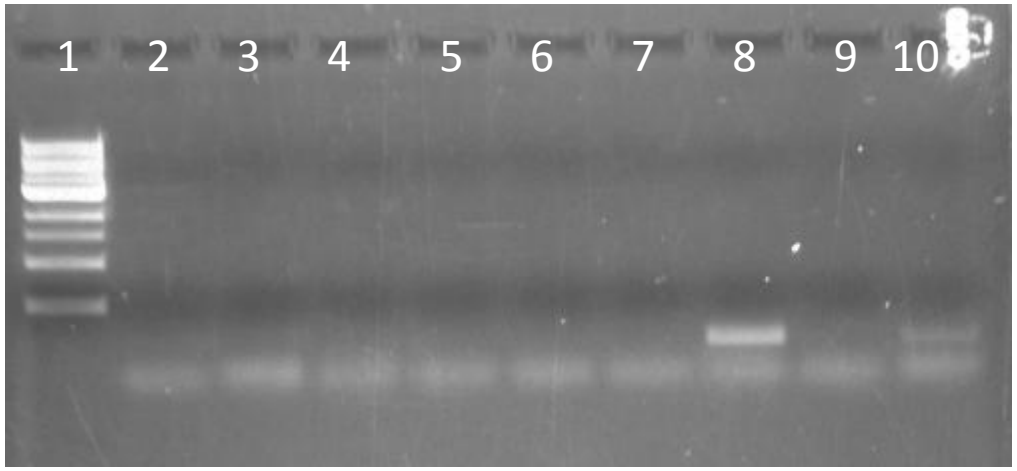


Lane	Sample
1	DNA Ladder
2	H20
3	2:12-7
4	2:12-8
5	2:12-9
6	2:12-10
7	2:12-11
8	2:12-12
9	2:12-13
10	2:12-15
11	2:18-1
12	2:13-4

Model 1 for Alternative Transposition

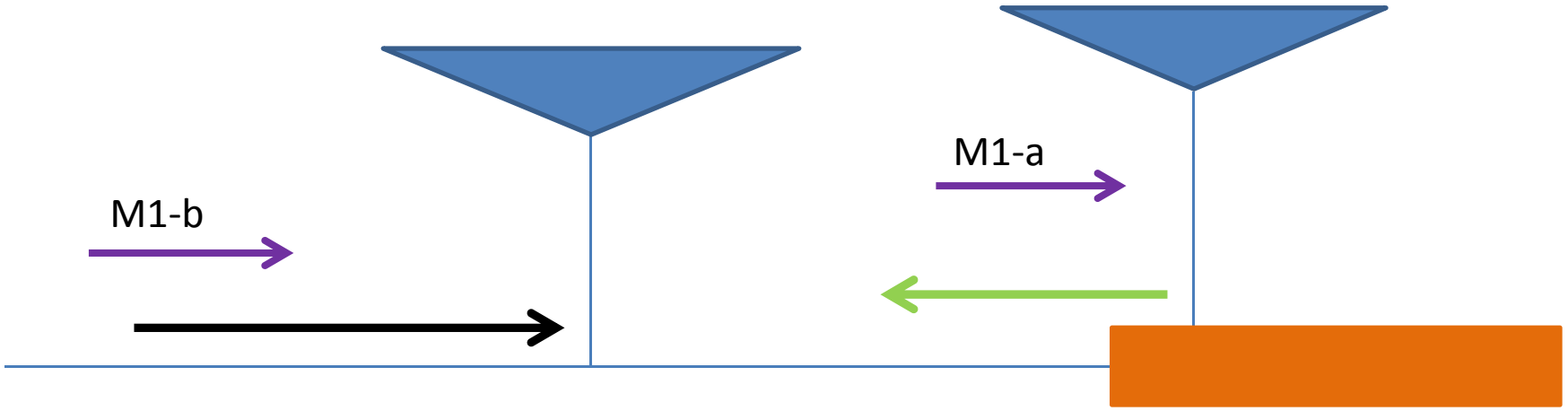


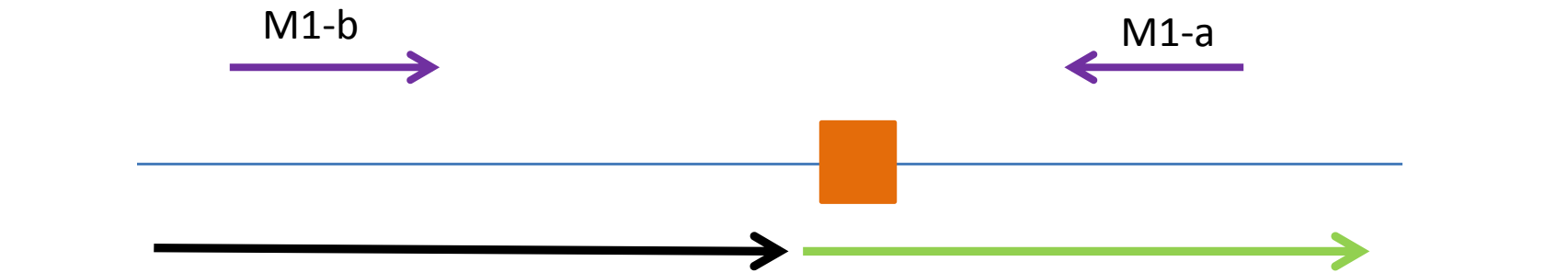
Testing for Alternative Transposition Model 1



Lane	Sample
1	DNA Ladder
2	H20
3	2:12-9
4	2:12-10
5	2:12-11
6	2:12-12
7	2:12-15
8	2:18-1
9	2:13-4
10	2:14-2

Sequencing





TTTTTTCACAAGAAGGCAGTTGAAGGTGCCATTTAC

Conclusion and Significance

- Evidence supports the occurrence of Alternative Transposition in Petunia
- The occurrence of Alternative Transposition in different species suggests that it may have had a significant impact on the evolution of plant genomes

Future Testing

- Continue to test plants with S857 allele for model 1 of Alternative Transposition
- Hypothesize other models for Alternative Transposition